

REMARKS

Please reconsider this application in view of the following remarks. Applicant thanks the Examiner for carefully considering this application.

Disposition of Claims

Claims 2-7 and 13-18 are pending in this application. Claims 2-7 and 13-18 are rejected. Claims 2 and 4 are independent. Claims 3, 13, 14, 16, 17, and 18 depend, directly or indirectly, from claim 2. Claim 15 depend, directly or indirectly, from claim 4. By way of this reply, claims 2 and 4 have been amended and claims 5-7 have been cancelled.

Amendments to the Claims

Claims 2 and 4 have been amended to include the subject matter from cancelled claims 5-7. Also claims 2 and 4 have been amended to clarify the invention recited. No new matter has been added by way of these amendments.

Rejections under U.S.C. § 103

Claims 2-7 and 13-18 are rejected under 35 U.S.C 103(a) as being unpatentable over U.S. Patent No. 6,640,642 ("Onose") in view of U.S. Patent No. 6,809,529 ("Okada"). Claims 5-7 have been cancelled, rendering the rejection with respect to these claims moot.

Claims 2 and 4 have been amended. To the extent this rejection may still apply to the amended claims, this rejection is respectfully traversed.

The present invention relates to a sensor sheet suitably used for measuring distribution of an applied, multidimensional force. In an embodiment of the present invention a sensor sheet has a large number of sensor cells. Each sensor cell has capacitance element electrodes corresponding to an X, Y, and Z direction and a displacement electrode arranged to form capacitance elements between the capacitance element electrodes and the displacement electrode. Also the sensor cells are arranged in a matrix. This arrangement enables measurement of distribution of three-dimensional components of a force that is applied over the overall sensor sheet based on the components of force detected in each of the large number of sensor cells.

The invention recited in claim 2 claims a sensor sheet comprising (i) a plurality of sensors arranged in a matrix, (ii) an elastic supporting member configured to partition a least two of the plurality of sensors from each other, and (iii) a cover layer configured to cover the plurality of sensors. At least one of the plurality of sensors comprises: (I) a plurality of first electrodes corresponding to a plurality of directions, respectively; (II) a second electrode supported by the elastic supporting member and facing the plurality of first electrodes such that capacitance elements are formed by the plurality of first electrodes and the second electrode. The second electrode is configured to be displaceable toward the plurality of first electrodes when an external force is applied thereto. One of the plurality of sensors also comprises (III) a core member is disposed between the cover layer and the second electrode and formed of rigid material arranged to permit independent movement thereof, wherein the core member individually corresponds to the one of the plurality of sensors. At least one of the plurality of

sensors is capable of identifying the external force in a multidimensional direction on the basis of detection of changes in capacitance of the capacitance elements caused by changes in distances between the plurality of first electrodes and the second electrode. The distribution of force applied to the cover layer is identified on the basis of the forces identified by at least two of the plurality of the sensors. Claim 4 claims the same elements except for element (II) which is claimed as; a second electrode supported by the elastic supporting member and facing the plurality of first electrodes and configured to be displaceable toward the plurality of first electrodes when an external force is applied thereto. Also one additional element, (IV) a pressure-sensitive resistance member arranged between the plurality of first electrodes and the second electrode, is claimed in claim 4.

Claims 2 and 4 both claim a sensor sheet comprising a number of elements as mentioned above. Specifically both claims include the element: *"a core member is disposed between the cover layer and the second electrode and formed of rigid material arranged to permit independent movement thereof, wherein the core member is individual to the at least one of the plurality of sensors, "*. An example embodiment of a core member **50** can be seen in figures 2 and 5. Support for the core member can be found in the specification in paragraphs [0030], and [0042] through [0047] and the cancelled claims 5-7. It is interesting to note that when an external force is applied, the core member displaces the force as it efficiently transmits it to the second electrode. As a result, the leaning of the second electrode, in accordance to the applied force, is well-pronounced and consistent as seen in figure 5. This provides more consistent spatial relationships between the electrodes for each sensor making the detection easier improving the accuracy of detection for each sensor.

The Examiner states that Onose's member 9 corresponds to the core member of the present invention. The member 9 in Onose, however, is disposed over a plurality of sensors as seen in figure 7 of Onose. So when a force is applied to Onose's member 9, it will not be able to displace as seen in Figure 5 of the current invention. The disclosed member 9 of Onose is therefore not able to provide the improved detection of the applied force and force components. One of ordinary skill in the art can appreciate that the core member, as claimed in the present invention, is not disclosed or taught by in Onose. The core member limitation of the current invention is therefore not rendered obvious by the prior art reference.

Additionally claim 4 has the additional element (IV), *"a pressure-sensitive resistance member arranged between the plurality of first electrodes and the second electrode"*. This element provides the capability of recognizing components of the externally applied force based on detection of the changes in resistance between the plurality of first electrodes and the second electrode. The pressure sensitive resistance is a member whose resistance values vary depending on the pressure applied or the contact area as seen in paragraph [0120] of the specification.

The Examiner states that Onose discloses a pressure sensitive film 4 located between the electrodes 3 and 6, pointing to Col. 4, lines 29-33 and Figure 5 for support. The Examiner suggests this is equivalent to the limitation (IV) *"a pressure-sensitive resistance member arranged between the plurality of first electrodes and the second electrode"* of the present claims. The film 4, in Col. 3, lines 29-33, is described as an insulation film and does not disclose or suggest that it is a member whose resistance values vary depending on the pressure. Onose only discloses a capacitance-type pressure sensor. No mention is made of a resistance-type sensor at all.

As explained above, Onose fails to teach or suggest at least the limitation of "*a core member is disposed between the cover layer and the second electrode and formed of rigid material arranged to permit independent movement thereof, wherein the core member is individual to the at least one of the plurality of sensors,* ". Okada fails to teach or suggest that which Onose lacks. Okada is completely silent with respect to the above limitation recited in claims 2 and 4.

In view of above, Onose and Okada, whether considered separately or in combination, fail to show or suggest the present invention as recited in claims 2 and 4. Thus, claims 2 and 4 as amended are patentable over Onose and Okada. Dependent claims are also allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 07700/042001).

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Respectfully submitted,

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